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worked by an automatic transfer mechanism. The tool may be adjustable to vary the forming stroke and thus the depth of louvre formed in the workpiece.

(54) Improved tool for forming
louvres and the like

(57) A tool for forming louvres or the like comprises a movable part 2 including a blade 8, having a cutting edge 9, and a former 6 and a fixed part comprising a member 10 with a cutting edge 12 cooperating with the blade 8 and a forming edge 13 cooperating with the former. A resiliently mounted stripper plate 14 is associated with the fixed part. The arrangement enables a louvre or the like to be formed upwardly in a workpiece in a single operation thereby allowing the workpiece to be moved on the

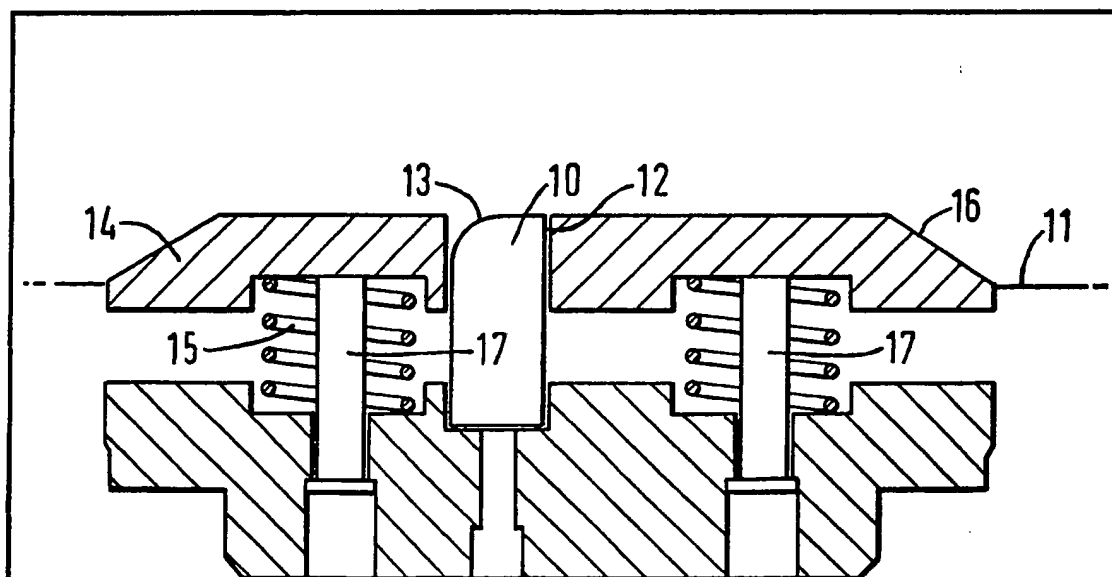


FIG. 1

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The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

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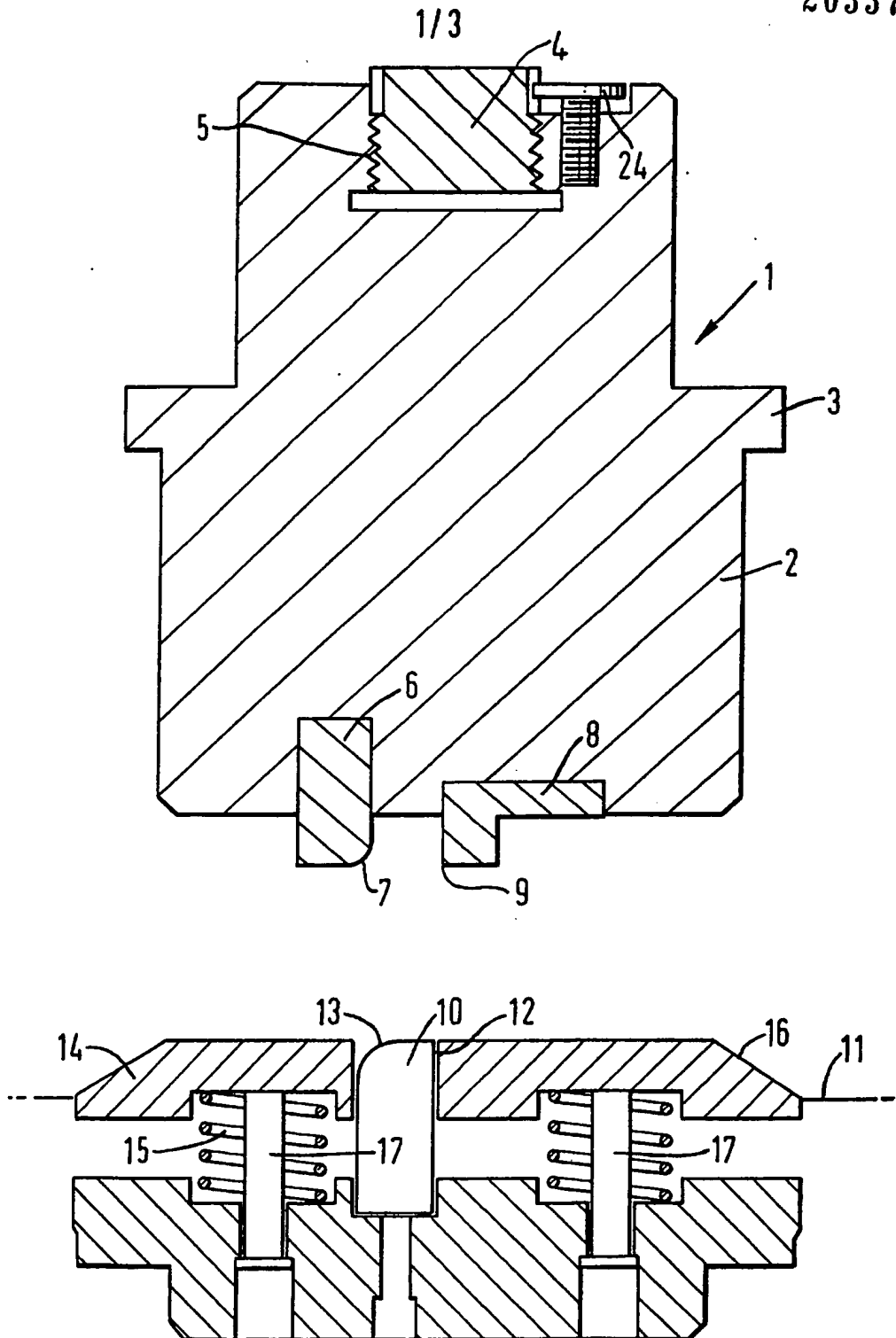


FIG. 1

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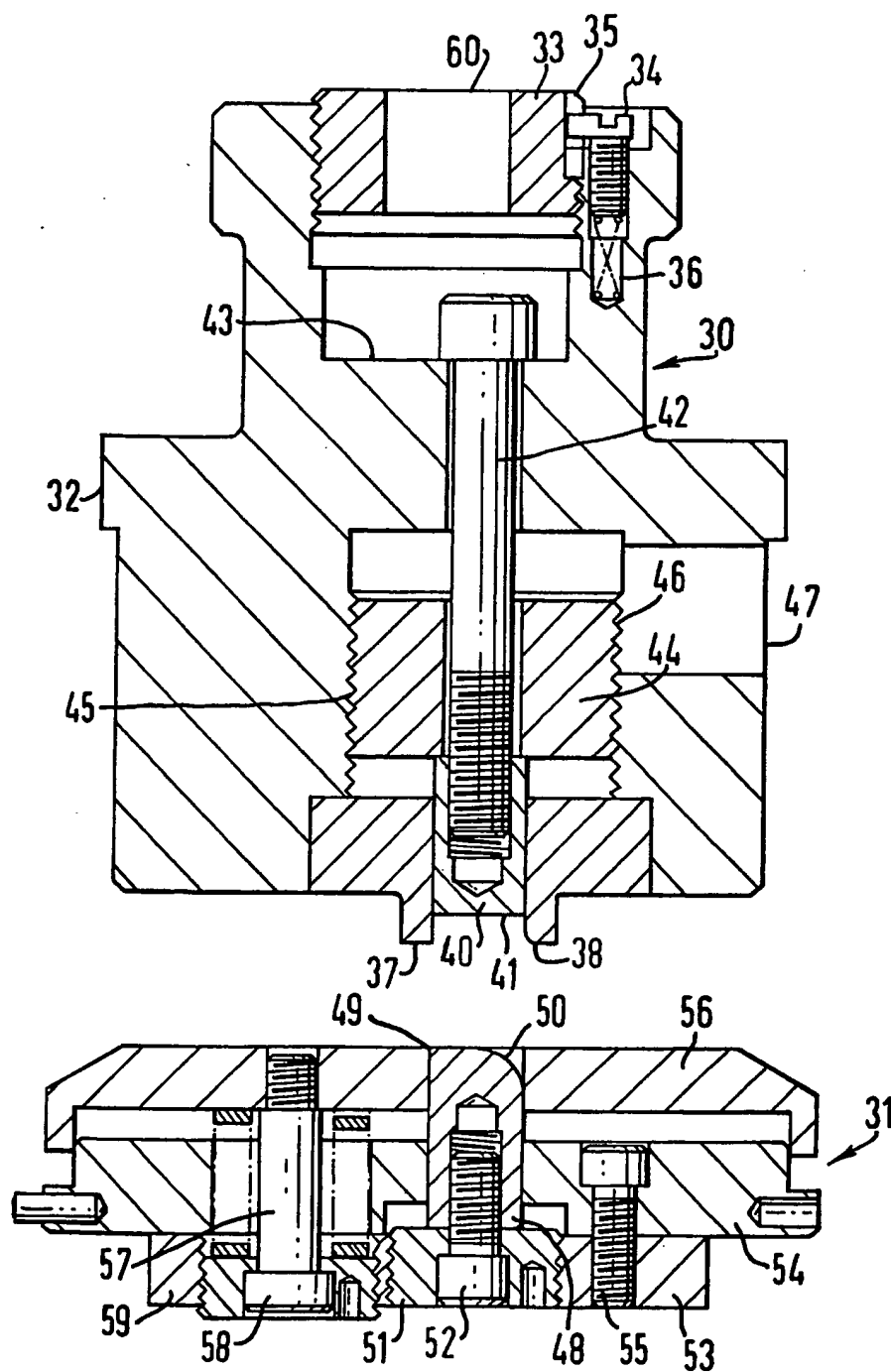


FIG. 2

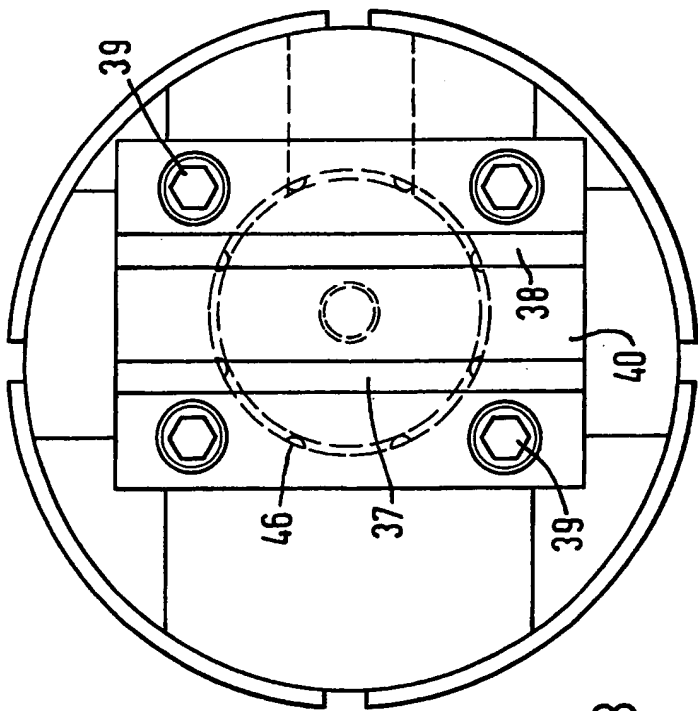


FIG. 3

SPECIFICATION

Improved tool for forming louvres and the like

5 This invention relates to an improved tool for forming louvres and the like.

At present louvres are formed by placing the workpiece over an appropriate die, punching so that the louvre is formed downwardly into the die, and then manually lifting out the workpiece with the louvre formed therein. Thus the present arrangement is slow and with the louvre formed downwardly the workpiece cannot be readily moved from one position to another on the workbed.

According to the present invention a tool for forming louvres and the like comprises a movable part including a blade and a former, a fixed part including a blade and a former, the movable part being movable relative to the fixed part and arranged to co-operate therewith to form said louvre or the like in the workpiece in a single operation, and stripping means associated with the fixed part for stripping the fixed member once the louvre or the like has been formed in the workpiece.

Preferably the blade and the former in the movable part of the tool are separate elements but if desired a single element could be used if appropriately contoured. The blade and the former of the fixed part are preferably on the same element of substantially rectangular cross-section, one side edge constituting a blade and the other side edge being radiused to act as a former.

The stripping means may a stripping plate protruding from the workbed by a distance corresponding to the forming stroke and being spring-biased so that after a forming operation a workpiece is automatically stripped. Preferably the edges of the stripping plate are inclined so that a workpiece may be easily located on the plate by automatic transfer means.

Adjustment means may be provided on the movable part to adjust the stroke relative to the ram. The depth of louvre to be formed may be adjustable by adjustment of the movable part and corresponding adjustment of the fixed part.

The invention also includes a method of forming a louvre in a sheet workpiece comprising the steps of providing a tool having a movable part including a blade and a former, a fixed part including a blade and a former, the blades being aligned, and resilient stripping means associated with the fixed part, locating the workpiece between the movable part and the fixed part, moving the movable part towards the fixed part so that a cut is made in the workpiece by the blades and the workpiece is formed into shape by said formers in a single operation, the resilient stripping means being pushed downwardly, and

releasing and retracting the movable part so that the stripping means returns to the rest position automatically stripping the blade of the fixed part leaving the workpiece with an upwardly formed louvre.

Preferably the method includes the additional steps of automatically moving the workpiece relative to the tool and forming a second louvre.

75 The invention will not be described by way of example with reference to the accompanying drawings in which:

Figure 1 is a side elevation of a first embodiment,

80 *Figure 2* is a side elevation of a second preferred embodiment, and

Figure 3 is an underneath plan view of the movable part of Fig. 2.

In Fig. 1 of the drawings a tool 1 comprises a body 2 having a shoulder 3 by means of which the tool is supported in an appropriate holder (not shown). At its upper end the body 2 has an adjustment striker member 4 which is in screw threaded engagement with an aperture 5 in the body 2. Adjustment of the striker member enables the height of the tool relative to the ram of a punch machine (not shown) to be altered to vary the stroke and readily accommodate various thicknesses of workpiece. A locking screw 24 associated with the striker member 4 is engageable with one of four circumferentially spaced grooves in the member 4 to prevent further angular displacement once its position has been set.

100 The lower end of the tool body 2 has secured to it a former 6 with a radiused forming edge 7 and a spaced blade 8 having a cutting edge 9.

The former 6 and blade 8 on the tool body 105 cooperate with a fixed blade 10 on the workbed 11. The fixed blade 10 has a cutting edge 12 which is aligned with the cutting edge 9 and a radiused forming edge 13 which is aligned with the forming edge 7.

110 The fixed blade 10 is normally surrounded by a stripper plate 14 which is biased into an upper position by four springs 15 and retained by four shoulders screw 17 to accommodate the stroke necessary to form the louvre. The stripper plate 14 has inclined edges 16 so that a workpiece may readily slide on and off the plate 14. In use of the first embodiment the striker member 4 is appropriately adjusted and locked in position by locking screw 24. The workpiece is then positioned below the movable tool on the stripper plate 14 and the movable tool moved downwardly by ram pressure on the striker member 4. As the movable tool meets the fixed blade 10 the stripper plate 14 is moved downwardly against the action of springs 15, a cut is formed in the workpiece by the cooperation of the cutting edges 9 and 12, and the workpiece opposite the cut is bent into a louvre by cooperation of the

forming edges 7 and 13. At the full extent of the stroke the stripper plate is fully retracted and the main part of the workpiece lies on the workbed.

- 5 On release of the ram pressure, the movable tool is returned to its position of rest by return springs (not shown) and the stripper plate 14 is automatically returned to its original position by springs 15 as limited by the shoulder screws 17, thus automatically stripping the fixed blade 10.

- Figs. 2 and 3 illustrate a second embodiment in which the depth of the louvre to be formed in a workpiece is adjustable, preferably between 0 and 7 mm. In Figs. 2 and 3 the tool comprises a movable part 30 and a fixed part 31. The movable part 30 has a shoulder 32 by means of which the tool is supported in an appropriate holder, such as a turret (not shown). At the upper end of the movable part 30 an adjustable striker member 33 is provided, similar to the striker member 4 of the first embodiment, which may be locked into position by the head of a locking screw 34 which is engageable with one of several circumferentially spaced grooves 35. The locking screw 34 is provided with a spring 36 to provide a back pressure to hold the screw in position.

- 30 The lower end of the movable part 30 has secured thereto the blade 37 and the former 38 by cap screws 39—see Fig. 3. Located between the blade 37 and the former 38 is a block 40 having a working face 41 which is adjustable to alter the depth of louvre formed as will be explained in more detail below. The block 40 is a sliding fit between the blade 37 and former 38 and is screw threaded onto a cap screw 42. The cap screw 42 has a clearance fit through the body of the movable part but its head engages a surface 43 on the body. The position of the working face 41 is determined by tightening an adjuster 44 into abutment with the block 40 so that the head of cap screw 42 is in engagement with the surface 43. The adjuster 44 has a clearance about the cap screw 42 but is in screw-threaded engagement with the body at 45. In order to move the adjuster 44 it is provided with eight circumferentially spaced notches 46—see particularly Fig. 3—and the body has a side access opening 47. In this way the adjusted may be rotated clockwise or anticlockwise as desired with the aid of a tool such as a screwdriver.

- The fixed part of the tool has a single blade 48 having a cutting edge 49 which is aligned with the cutting edge of blade 37 and a radiused forming edge 50 which is aligned with the forming edge of former 38. The blade 48 is held in place, with respect to two adjuster members 51, by cap screws 52 (only one of which member and screws are shown). The adjuster member 51 is in screw-threaded engagement with a plate 53 which is secured

to die plate 54 by screws 55.

- The protruding part of blade 48 is surrounded by a stripper plate 56 biased into its extended position, shown in Fig. 2, by means of three spring assemblies 57 (only one of which is shown). The movement of the stripper plate 56 is determined by the shoulder screw 58 which engages with adjuster member 59. Adjuster member 59 is in screw-threaded engagement with the plate 53 and adjustment of the member 59 on the respective spring assemblies will alter the stroke of the stripper plate.

- In use the depth of the louvre to be formed is determined by the distance between the tips of the blade 37 and formed 38 and the working face 41. Once this depth has been set the fixed blade 48 and stripper have to be adjusted to correspond. In order to adjust the depth of the louvre to be formed from the position shown in Fig. 2 which is the maximum stroke, the cap screw 42 is loosened and then the adjuster 44 turned anticlockwise when viewed from below so that the block 40 moves downwardly between the blade 37 and the formed 38 until the required dimension of louvre, taking account of material thickness is obtained, the screw 42 is then tightened until its head engages the surface 43. The adjustment of the cap screw 42 is effected by inserting an Allen key through an opening 60 in the striker member 33 and the rotation of adjuster 44 is effected by inserting a tool through opening 47 into engagement with one of the notches 46.

- Corresponding adjustment for the fixed part of the tool is provided by first rotating the adjuster members 59 to their fullest extent so that the stripper plate 56 abuts the die plate 54 and then adjusting the position of the blade 48 so that the distance between the stripper plate 56 and the tip of the blade 48 corresponds to the distance between the tips of the blade 37 and the former 38 and the working face 41. This adjustment is made by loosening the screws 52 and then appropriately tightening the adjuster members 51. Once the blade 48 is accurately positioned the adjuster members 59 are released until the top of the stripper plate 56, in its extended position, is aligned with the top of the blade 48. With the arrangement of the second embodiment the louvre is formed in the workpiece in the same way as described with reference to Fig. 1. However, the adjustment provided enables the same tool to be used for louvres of different depths as desired.

- Because the louvre is formed upwardly the workpiece may be moved automatically to another position without lifting for another louvre to be formed. This tool may therefore be used on an automatic machine such as a numerically controlled punch machine which results in considerable time saving.

CLAIMS

1. A tool for forming a louvre or the like in a workpiece comprising a movable part including a blade and a former, a fixed part including a blade and a former, the movable part being movable relative to the fixed part and arranged to cooperate therewith to form said louvre or the like in the workpiece in a single operation, and stripping means associated with the fixed part for stripping the fixed member once the louvre or the like has been formed in the workpiece.
2. A tool according to claim 1 wherein the blade and the former of the movable part are separate elements.
3. A tool according to claim 1 or 2 wherein the blade and the former of the fixed part on the same element, one edge constituting a blade and another edge being radiused to act as a former.
4. A tool according to any one of the preceding claims wherein the stripping means is a stripping plate arranged to protrude above the workbed by a distance corresponding to the forming stroke and being spring-biased so that after a forming operation a workpiece is automatically stripped.
5. A tool according to claim 4 wherein the edges of the stripping plate are inclined so that a workpiece may be easily located on the plate by automatic transfer means.
6. A tool according to any one of the preceding claims comprising an adjustable striker element on the movable part for adjustment of the stroke of the movable part to accommodate various material thicknesses.
7. A tool according to any one of the preceding claims wherein the depth of louvre to be formed is adjustable by adjustment of the movable part and corresponding adjustment of the fixed part.
8. A tool according to claim 7 wherein the blade and former of the movable part are separate elements spaced apart by an axially slidable block the lower working face of which defines the depth of louvre to be formed.
9. A tool according to claim 8 wherein the blade and the former of the fixed part are on the same element arranged to protrude above a workbed supporting the workpiece, the said element being axially adjustable so as to protrude above the workbed by a distance corresponding to the depth of louvre to be formed defined by the axially slidable block.
10. A tool according to claim 9 wherein the stripping means has an upper planar surface perpendicular to the axis of movement of the movable part and which is axially adjustable so that the upper surface may be aligned with the top of the protruding blade and former of the fixed part.
11. A method of forming a louvre in a sheet workpiece comprising the steps of providing a tool having a movable part including a blade and a former, a fixed part including a blade and a former, the blades being aligned, and resilient stripping means associated with the fixed part, locating the workpiece between the movable part and the fixed part, moving the movable part towards the fixed part so that a cut is made in the workpiece by the blades and the workpiece is formed into shape by said formers in a single operation, the resilient stripping means being pushed downwardly, and releasing and retracting the movable part so that the stripping means returns to its rest position automatically stripping the blade of the fixed part leaving the workpiece with an upwardly formed louvre.
12. A method according to claim 11 including the additional steps of automatically moving the workpiece relative to the tool and forming a second louvre in the same workpiece.
13. A method of forming a louvre substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.
14. A tool for forming louvres and the like substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

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